

WHAT IS CLAIMED IS:

1. An image sensor module comprising:

an image sensor chip mounted on a substrate;

5 a housing installed on the substrate and having a step portion for retaining a lens above the image sensor chip;

a lens unit placed on the step portion for forming an image of an object on the image sensor chip; and

10 a lens retainer installed on the housing;

wherein the lens retainer comprises an elastically deformable portion, and the lens unit is pressed against the step portion of the housing by a biasing force caused by the elastically deformable portion.

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2. The image sensor module according to Claim 1, wherein the lens retainer further comprises a first portion fixed to an upper face of the housing, and a second portion held in contact with an upper face of the lens unit, the elastically  
20 deformable portion being disposed between the first portion and the second portion.

3. The image sensor module according to Claim 2, wherein the first portion of the lens retainer is formed with a  
25 projection, the upper face of the housing being formed with a recess for engagement with the projection.

4. The image sensor according to Claim 2, wherein the lens retainer covers a portion of the upper face of the lens unit except for a predetermined central area of the lens unit.
- 5 5. The image sensor module according to Claim 2, wherein the lens unit includes an upper portion protruding above the upper face of the housing.
6. The image sensor module according to Claim 2, wherein  
10 the lens retainer includes an intermediate portion between the first portion and the second portion, the intermediate portion being formed with a recess for thickness reduction.
7. The image sensor module according to Claim 1, wherein  
15 the lens unit comprises a combination of a first lens and a second lens, the first lens having a concave lens face, the second lens member having a convex lens face that is spaced from the concave lens face.
- 20 8. The image sensor module according to Claim 7, wherein the first lens has a positioning projection, the second lens having a recess for engagement with the positioning projection.
- 25 9. The image sensor module according to Claim 1, further comprising an additional step portion located below the first-mentioned step portion, and an optical filter installed on the additional step portion.

10. An image sensor module comprising:

an image sensor chip mounted on a substrate; and

a lens unit including a lens portion that faces the image sensor chip, and a spacer extending downward from the

5 lens portion;

wherein the spacer directly contacts the image sensor chip.

11. The image sensor module according to Claim 10, wherein

10 the spacer is fixed to the image sensor chip via an adhesive.

12. The image sensor module according to Claim 10, wherein the lens unit comprises a first lens integrated with the spacer and a second lens combined with the first lens.

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13. The image sensor module according to Claim 10, further comprising an optical filter that covers the lens portion of the lens unit.

20 14. The image sensor module according to Claim 13, further comprising a diaphragm disposed between the lens unit and the optical filter.

15. A method for manufacturing an image sensor module  
25 comprising the steps of:

mounting an image sensor chip on a substrate; and

mounting a lens unit on the image sensor chip;

wherein the lens unit comprises a lens portion and a spacer extending from the lens portion, the spacer being brought into direct contact with the image sensor chip when the lens unit is mounted on the image sensor chip.

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16. A method for manufacturing an image sensor module which comprises an image sensor chip mounted on a substrate and a lens unit having a lens face that faces the image sensor chip, the method comprising steps of:

10         adjusting a distance between the image sensor chip and the lens face; and

              fixing the lens unit after the distance adjustment.

17. The manufacturing method according to Claim 16, wherein  
15         the distance is adjusted by displacing the lens face while the image sensor chip is capturing an image of a test chart through the lens face, so that the captured image of the test chart becomes optimum.

20         18. The manufacturing method according to Claim 16, wherein the lens unit is fixed by using ultraviolet curing resin.

19. The manufacturing method according to Claim 16, wherein  
25         the distance is adjusted by moving a housing retaining the lens unit.

20. The manufacturing method according to Claim 16, wherein the distance is adjusted by moving the lens unit relative to a housing fixed to the substrate.